

**A STUDY ON THE EFFECTIVENESS OF MOTOR
RELEARNING PROGRAMME TO IMPROVE BALANCE IN
RIGHT SIDE HEMIPARESIS PATIENTS**

*A dissertation submitted in partial fulfillment of the requirement
for the degree of*

MASTER OF PHYSIOTHERAPY

ELECTIVE – ADVANCED PT IN NEUROLOGY



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RVS COLLEGE OF PHYSIOTHERAPY

(Affiliated to the Tamil Nadu Dr. M.G.R Medical University, Chennai – 32)

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TAMIL NADU

INDIA

**A STUDY ON THE EFFECTIVENESS OF MOTOR
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**SUBMITTED IN PARTIAL FULFILLMENT OF THE
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Dr. M.G.R. MEDICAL UNIVERSITY,

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(APRIL 2011)

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EXAMINERS

1. INTERNAL EXAMINER

2. EXTERNAL EXAMINER

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DECLARATION

I hereby declare and present my project work entitled **“EFFECTIVENESS OF MOTOR RELEARNING PROGRAMME FOR IMPROVING BALANCE IN RIGHT SIDE HEMIPARESIS PATIENTS”**. The outcome of the original research work undertaken and carried out by me, under the guidance of **Mrs.L.MAHALAKSHMI, MPT, Ph. D, Associate Professor, RVS COLLEGE OF PHYSIOTHERAPY, SULUR, COIMBATORE.**

I also declare that the material of this project work has not formed in any way the basis for the award of any other degree previously from **The Tamil Nadu Dr. M.G.R Medical University, Chennai.**

SIGNATURE

ACKNOWLEDGEMENT

I express my thanks to God almighty for providing me the wisdom and knowledge to complete my study successfully.

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I take this golden opportunity to thank each and every patient who took part in this study for their kind co-operation and needed information.

DEDICATION

TO MY PARENTS: Thank you for believing in me; and allowing me to further my studies. I am honoured to have you as my parents. Thank you for giving me a chance to prove and improve myself through all my walks of life.

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I. INTRODUCTION

The World Health Organization [WHO] defines stroke as “rapid onset of an event of vascular origin, reflecting a focal disturbance of cerebral function, excluding isolated impairments of higher function and persisting longer than 24 hours”. The stroke is the third most common cause of death with 160,000 dying each year in the United States. The incidence of stroke is greater in men than in women and it is twice as high as in blacks as in whites (Darcy. A. Umphred 2002). In the early 1980's the prevalence rates of stroke were around 500-700 per 1,000,000 in the Western countries and 900 per 1,000,000 in Asia (Tapas Kumar 2006). It is therefore clear that stroke incidence in India has been registering an upward trend in the last few decades, while the incidence of stroke in western countries has declined or plateaued (Subash Kaul 2007). Most studies have a large number of ischemic to hemorrhagic stroke 57.3% to 89% and 13.6% to 37.9% respectively as seen in Western countries. Occlusive stroke account for 80% of all Cerebrovascular accidents [CVA] and may be thrombotic or embolic in origin. Hemorrhagic strokes which are those associated with rupture of blood vessels account approximately 20% of strokes (Mitchell.H.Cameron 2007).

The strokes are of two main types – ischemia with or without infarction and hemorrhage and unless one or other occurs, the vascular lesion usually remains silent (Adams and Victor). Cerebral ischemia and infarction are usually caused by sudden occlusion of an artery supplying brain or less often by low flow distal to an already occluded or highly stenosed artery. Subarchnoid hemorrhage is due to bleeding from intracranial vascular malformation. The subdural hemorrhage is often

traumatic or due to ventricular decompression for hydrocephalus. The spontaneous intracranial hemorrhage occur within the ventricle is primary intraventricular hemorrhage is very unusual except in premature babies and in adult the cause is not found (mitchael 2001).

Stroke is a highly disabling disease, of these 44% experienced mild consequences of stroke, 21% of moderate stroke, 16% severe and 19% very severe consequences of stroke in their activities of daily living and social participation (Roland PS 2008). Studies shows that as many as 12% - 18% of survivors are dysphasic, 22% may be unable to walk, 32% are clinically depressed and 24%-53% remain dependent on caregivers for activities of daily living . Balance is frequently disturbed following stroke and the impairment in steadiness, symmetry, and dynamic stability is common (susan sullivan 2007). After a stroke the ability to balance effectively and make the necessary postural adjustments are frequently found to be impaired. Co-ordination of movement pattern and balance both involve the complex pyramidal and extra pyramidal systems that are disrupted by stroke. There is impairment in muscle force generation particularly with sustaining force and delay in anticipatory and postural activities on the hemiplegic's side. Stroke disturbs the autonomic postural response that contributes to sitting and standing balance. These deficits affect the ability of patients following to perform activities of daily living [ADL] with confidence and are related to a high risk of falling.

Different neurological treatment approaches including Bobath, Brunnstrom, Rood, Johnston, Proprioceptive neuromuscular facilitation[PNF], Motor relearning programme[MRP], Ayres or combinations of the above are investigated. With exceptions of two randomized controlled trials, all studies evaluated effects of

Bobath and one of the treatment arms, whereas one study used two experimental groups. Eight studies measured activities of daily living [ADL] with Barthel index, the functional independence measure or other activities of daily living [ADL] scales as an outcome and four studies evaluated strength, synergism or muscle tone. Three studies assess the effects of a neurological approach on length of stay and compared the effects of Motor relearning programme and Bobath, Proprioceptive neuromuscular facilitation and Brunnstrom or Neuromuscular retraining techniques where as on controlled clinical trials compared on impairment oriented with a disability focused approach. Best evidence for reduced length of stay in favour of motor relearning programme or traditional care compared to impairment focused neuromuscular treatment approach such as Bobath. No evidence was found for applying a specific neurological treatment programs in terms of muscle strength synergism, muscle tone, walking ability, dexterity of activities of daily living (Peppen 2008).

Carr and Shepherd had developed Motor Relearning programme for stroke that incorporates many aspects of motor theory and provide practical guidelines for retraining functional skills. Motor Relearning Programme can be commenced as soon as patient is medically stable. The task oriented approaches suggested by Carr and Shepherd and Shumwaycook and Woolacott are based on scientist's current understanding of how movement arises from the interaction between systems at the level of individual, environment and task (Carr and shepherd 1987).

Hence the motivation to conduct a study in which Conventional Physiotherapy and Motor Relearning Programme is compared, Motor Relearning

Prolonged is used effectively in practice but also little evidence remains to advocate its use in form of Randomized control trial.

By comparing Motor Relearning Programme and Conventional Physiotherapy for treating balance impairment in right side hemiparesis provide insight as to which technique would be beneficial to the stroke patients.

1.1 Statement of the problem

The study proposes to evaluate the effectiveness of Motor Relearning Programme as opposed to Conventional Physiotherapy in the treatment of balance impairment in right side hemiparesis patients.

1.2 Need for the study

There are different approaches for improving balance in hemiplegic patients. This study is designed to find out the effectiveness of Motor Relearning Programme over Conventional Physiotherapy in right side hemiparesis patients. In patients with stroke, the goal of various treatment approaches are to achieve maximum functional improvement. There is a little literature evidence for the effectiveness of Motor Relearning Programme in improving balance in right side hemiparesis patients. Even though, this technique is commonly used for patients having impaired balance. So it is necessary to study the effectiveness of Motor Relearning Programme in right side hemiparesis patients to improve balance.

1.3 Aim and objective of the study

1.3.1 Aim

The aim of the study is to find out the relative effectiveness of Motor relearning programme to improve balance in patients with right side hemiparesis.

1.3.2 Objectives

- To find out the effectiveness of motor relearning programme to improve balance in right side hemiparesis patients.
- To find out the effectiveness of conventional physiotherapy to improve balance in right side hemiparesis patients.
- Relative effectiveness of motor relearning programme over conventional physiotherapy to improve balance in right side hemiparesis patients.

1.4 Hypothesis

Null hypothesis

There is no significant effect in Motor Relearning Programme to improve balance in right side hemiparesis patients.

Alternate hypothesis

There is a significant effect in Motor Relearning Programme to improve balance in right side hemiparesis patients.

1.5 Operational definitions

Stroke

Stroke is defined as a clinical syndrome characterized by rapidly developing clinical signs of focal or global disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death with no apparent cause other than of vascular origin.

Balance

The ability to align body segments against gravity to maintain or move the body (Centre of mass) within the available base of support without falling.

Motor Relearning Programme

Incorporates functional training for key motor tasks such as sitting, standing, standing up, or walking. The therapist analyses each task, determines which component of task cannot be performed, trains the patient in these components of the task, and ensures carryover of this training during daily activities.

Conventional Physiotherapy:

A currently and widely used, physiotherapy treatment for a certain type of disease based on the results of past research.

1. Passive range of motion.
2. Active assisted range of movements.
3. Balance exercise.

2. REVIEW OF LITERATURE

REVIEW OF LITERATURE RELATED TO MOTOR RELEARNING PROGRAMME

1. Dora. Y. L (2006)

Conducted a study titled “Motor relearning programme for stroke patients: a randomized controlled trial”. The objective of this study is the efficacy of the motor relearning approach in promoting physical function and task performance for patients after a stroke. 52 out patients received 18-20 hour sessions in six weeks of either motor relearning programme or a conventional therapy programme. Patients were assessed using Berg balance scale, timed Up and Go test, functional independence measure, modified Lawton instrumental activities of daily living test, and the community integration questionnaire. In the motor relearning programme group shows significantly better performance on all but timed up and Go test when compared with the control group. The results shows, the motor relearning found to be more effective.

2. Krutulyte. G (2003)

Conducted a study titled “The effectiveness of the physical therapy methods in rehabilitation of stroke patients”. The purpose of this study was to examine whether two different physiotherapy regimes caused any differences in outcome in the rehabilitation after stroke. The study examines 240 patients with stroke. patients were divided into two groups: Bobath method and motor relearning method was applied this study indicates that physiotherapy with task oriented strategies represented by

motor relearning programme ,is preferable to physiotherapy with facilitation / inhibition strategies in the rehabilitation of stroke patients.

3. Laufer. Y. (2003)

Conducted a study titled “Standing balance and functional recovery of patients with right and left hemi paresis in the early stages of rehabilitation”. The objective was to determine the effects of side of brain lesion on recovery of functional abilities and balance control among subjects two months following stroke. There were 104 patients admitted consecutively to a geriatric rehabilitation centre following their first stroke to the anterior brain circulation who were followed for two months .The results shows that lesion side affects the recovery of independent stance two months following a stroke, with more patients with hemiparesis able to reach this milestone. However no difference were found in functional ability and balance control between patients with right and left hemiparesis who are able to stand independently by one month post stroke.

4. Page. S. J (2003)

Conducted a study titled “The intensity versus task-specificity after stroke: how important is intensity”. Recent evidence suggests that intense training regimes can increase the use and function of the more affected limbs of the stroke patients. In this commentary, we review the evidence supporting the efficacy of less intense, task specific training regimens emphasizing the use of the more affected limb. Rather the results of this study suggest that the nature of stroke motor therapy itself can be altered to be more tasks specific while remaining within the typical contact time parameters, yet can be more effective than more traditional motor rehabilitative approaches.

5. Stanghelle. J. k (2003)

Conducted a study titled “Bobath or motor relearning program- a follow up one and four years post stroke”. The purpose of this study was to find out whether the initial physiotherapy approach had any long term effects on mortality, motor function, postural control, activities of daily living, life quality follow up from community services and living conditions. Sixty one patients were participated in the study at Baerum hospital outpatient clinic. In both groups the motor function, postural control and activities of daily living had decreased rapidly, leaving many of the patient’s dependant and with a high risk of falling. The results shown that the initial physiotherapy approach did not seem to have a major influence on the patient’s ability to cope in the long- term.

6. Kimtys. A (2003)

The study indicates that physiotherapy with task-oriented strategies represented by motor relearning programme, is preferable to physiotherapy with facilitation/inhibition strategies, such the Bobath programme, in the rehabilitation of stroke patients.

7. Barret. J. A (2001)

Conducted a study on “Bobath or motor relearning programme: a continuing debate”. The study is to examine whether two different regimes caused any differences in outcomes in rehabilitation after acute stroke. A double blinded study of patients with acute first ever stroke. Sixty one patients were consecutively included. The study showed women treated by Motor relearning programme improved more in activities of daily living than women treated with Bobath. Patients treated according

to Motor relearning programme stayed fewer days in hospital than those treated according to Bobath.

8. Langhammer. B (2001)

Conducted a study titled “Physiotherapy after stroke as randomized control trial”. This study examines whether two different physiotherapy regimes used in rehabilitation after stroke have any difference in outcome. A double blind study of patients with first ever stroke .Sixty one patients were consecutively included, block-randomized into two groups and stratified according to gender and hemispheric location. patients treated according to the motor relearning programme had shorter stays in hospital compared to those treated according to Bobath.This study indicates that physiotherapy according to motor relearning programme is preferable to the Bobath programme in the rehabilitation of stroke patients.

9. Chewtwyn CH

Conducted a study titled the efficacy of the motor relearning approach in promoting physical function and task performance for patients after a stroke.The motor relearning programme was found to be effective for enhancing functional recovery of patients who had a stroke.

10. Catherine. M. dean (1997)

Conducted a study titled “Task related training improves performance of seated reaching tasks after stroke.” twenty subjects at least one year after stroke were randomized into an experimental or control group. The experimental group receives standardized training program which involve reaching forward ie,beyond arms length. The control group receives sham training. After training experimental subjects were

able to reach faster and further, increase load through the affected foot, and increase activation of affected leg muscles compared with control group.

11. Carr and Shepherd (1987)

They described many of these strategies in their book entitled “Motor Relearning programme for stroke”. In motor relearning programme the order in which the section appears is unimportant as there is no intent of progression from section to section.

REVIW OF LITERATURE RELATED TO BERG BALANCE SCALE

1. Nichol corner (2008)

Conducted a study on “Usefulness of the Berg balance scale in stroke rehabilitation”. The Berg balance scale is originally designed to quantitatively assess the balance in older adults. In the recent study of 655 physical therapists working in stroke rehabilitation, the Berg balance scale was identified as a most commonly used assessment tool across the continuum from acute care to community based care. The results suggest that the Berg balance scale has strong validity, reliability and responsiveness to change and the test is useful and easy to administer without the need of expensive equipment or prolonged assessment time.

2. Feld J. A. (2001)

Conducted a study titled “Berg balance scale and outcome measures in acquired brain injury”. This study is to examine the relationship of the berg balance scale to outcome after acquired brain injury. Forty consecutive patients were assessed with berg balance scale. The berg balance scale is originally designed as a quantitative measure of balance and risk of falls. Prediction of rehabilitative outcome might be enhanced by the use of berg balance scale scores in combination with other clinical measures on admission to inpatient acute rehabilitation.

3. MATERIALS AND METHODOLOGY

3.1 Research design

Experimental pre test – post test design comparative in nature.

3.2 Variables used in the study

3.2.1 Independent variables

- Motor relearning programme
- Conventional therapy

3.2.2 Dependent variables

- Balance

3.3 Study setting

The study was conducted at Department of Physiotherapy , KMCT Medical College Hospital, Mukkam, Calicut with consultation of concerned authority.

3.4 Sample population and method of sampling

30 patients are selected from the stroke population using convenient sampling technique.

3.5 Criteria for selection

3.5.1 Inclusion criteria

1. Age between 45 and 55 years.
2. Both genders are included.

3. Patients with right side hemiparesis.
4. Post stroke patients within first 3 weeks.
5. Confirmed first stroke.
6. Stable medical condition.
7. Subjects who signed the informed consent.

3.5.2 Exclusion criteria

1. Non co-operative subjects.
2. Past history of seizure.
3. Traumatic brain injuries.
4. Severe cardiovascular problems.
5. Visual-perceptual problems.

3.6 Study duration

Total duration of the study was 3 months. During which each patient received treatment session of 30 minutes each day for four days per week for 6 weeks.

3.7 Measuring tool

- Berg Balance Scale

3.8 Materials used

1. Stop watch.
2. Ruler

3. Two chairs used of reasonable height. (One with arm support and one without arm support.)
4. Book
5. Step.

3.9 Procedure

Data Collection Procedure

A total of 30 stroke patient diagnosed by neurologist and physician were selected who met the inclusion criteria are divided in to two groups, group A and group B using convenient sampling. 15 patients were taken in each group. Conventional physiotherapy was given to group A and Group B patients received Motor Relearning Programme. Both groups were trained for 30 minute for four days per week over 6 weeks. Pre-test and post-test scores were taken before and after the treatment programme respectively using Berg balance scale.

Group A Treatment Protocol - Conventional Physiotherapy

1. Passive range of motion - These movements are produced by an external force during muscular inactivity or when muscular activity is voluntarily reduced as much as possible to permit movement.
2. Active assisted range of movements - The assistance is provided manually or mechanically by an outside force because the prime mover muscles need assistance to complete the motion.
3. Balance exercise.

Exercises while sitting in a chair

- Set – 1 (for the lower extremities)
 - Extend leg up then back down.
 - Raise up and down on toes then heels.
- Set – 2 (for the upper extremities)
 - Bend arms towards shoulders then back down again.
 - Push arms out away from chest then back again.

Standing exercises for balance

- Bring leg in toward the middle then back out again.
- Rise up and down on heels and then toes.
- March in place.

Group B Treatment Protocol - Motor Relearning Programme

1. Sit up over side of the bed.

Position of the patient – supine lying

Position of the therapist – walk standing

- a) Therapist assist patient to lift his head off the pillow and patient attempts to lower his head to the pillow, contracting his lateral flexors eccentrically. Therapist then practices lifting his head sideways unaided.

- b) Patient lifts his head laterally, while therapist with one hand under the shoulder and the other pushing downwards on his pelvis, help him to move up into the sitting position. Therapist may need to assist his legs over the side of bed.

2. Balanced sitting

Position of the patient – sitting

Position of the therapist – standing

- a) Patient is sitting, hands in lap, patient turns head and trunk to look over his shoulder, returns to the mid position, repeats to the other side.
- b) Patient is sitting then reaches forward and sideways to touch an object, downwards towards floor and to both sides, each time returning to the upright position.
- c) Patient is instructed to flex the spine and head thus controlling movement backwards.
- d) Patient is instructed to flex the hip and not at the spine in order to move forward.

3. Standing balance.

Position of the patient – standing

Position of the therapist - standing

- a) Patient is in standing, with seat a few inch apart patient turns head and trunk to look behind, returns to mid position and repeats to other side.

- b) patient stands with a back against a wall, with feet a few inch away from it ,patient moves his hip away from the wall ,therapist gives a slight assistance to guide the movement .During this movement dorsiflexion activity is elicited.
- c) Patient practices eccentric and concentric knee flexion control.
- d) Patient practices stepping forward and then backwards with intact leg, affected hip in extension.
- e) Patient practices standing with intact leg in front of affected leg.
- d) Patient practices moving weight forward over intact foot and backward, while maintaining knee extension of the affected leg, step size is small.
- e) Affected foot on step, patient shifts weight forward and steps upon to the step and back down again the intact leg.
- f) Standing on the intact leg, affected foot assisted into dorsiflexion with knee in extension, patient moves weight forward on to the heel.
- g) Patient walk backward, with a guided knee flexion and foot dorsiflexion.

4. DATA ANALYSIS AND INTERPREATION

The data collected was subjected to paired 't' test individually for group A and group B using formulas.

Formula 1

$$\bar{d} = \sum d/n$$

Where,

d = difference between pre test and post test values

\bar{d} = is the mean value of d

n = is the number of subjects

Formula 2:

$$\text{Standard deviation SD} = \sqrt{\frac{\sum (d - \bar{d})^2}{(n - 1)}}$$

Formula 3:

$$\text{Standard Error (S.E)} = \frac{SD}{\sqrt{n}}$$

$$\text{'t' calculated value} = \frac{\bar{d}}{S.E}$$

Formula 4:

$$\text{'t' cal} = \frac{d}{S.E}$$

Where, t cal is the 't' calculated value

d = mean of deviation

n = total number of subjects

s = standard deviation

Σd^2 = sum of squared deviation

4. Independent 't' test

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s} \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

$$\text{Where } S = \sqrt{\frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

\bar{X}_1 = Mean of Control group

\bar{X}_2 = Mean of Experimental group

n_1 = Number of Subjects in Control group

n_2 = Number of Subjects in Experimental group

S = Standard Deviation

Data were collected from 30 patients analyzed using paired 't' test and Independent 't' test to find out within group difference. All data was analyzed using SPSS version 10.0.

TABLE 1
DESCRIPTIVE DATA OF EXPERIMENTAL GROUP

S.No	Age Year	Sex	Berg Balance Scale	
			Pre-test	Post test
1	46	M	36	48
2	47	M	38	45
3	45	M	37	45
4	50	F	35	46
5	49	M	38	47
6	52	F	37	45
7	54	F	39	48
8	49	M	37	46
9	47	M	38	48
10	53	F	39	44
11	54	F	38	46
12	50	M	39	47
13	46	F	35	45
14	48	F	33	45
15	53	M	36	47

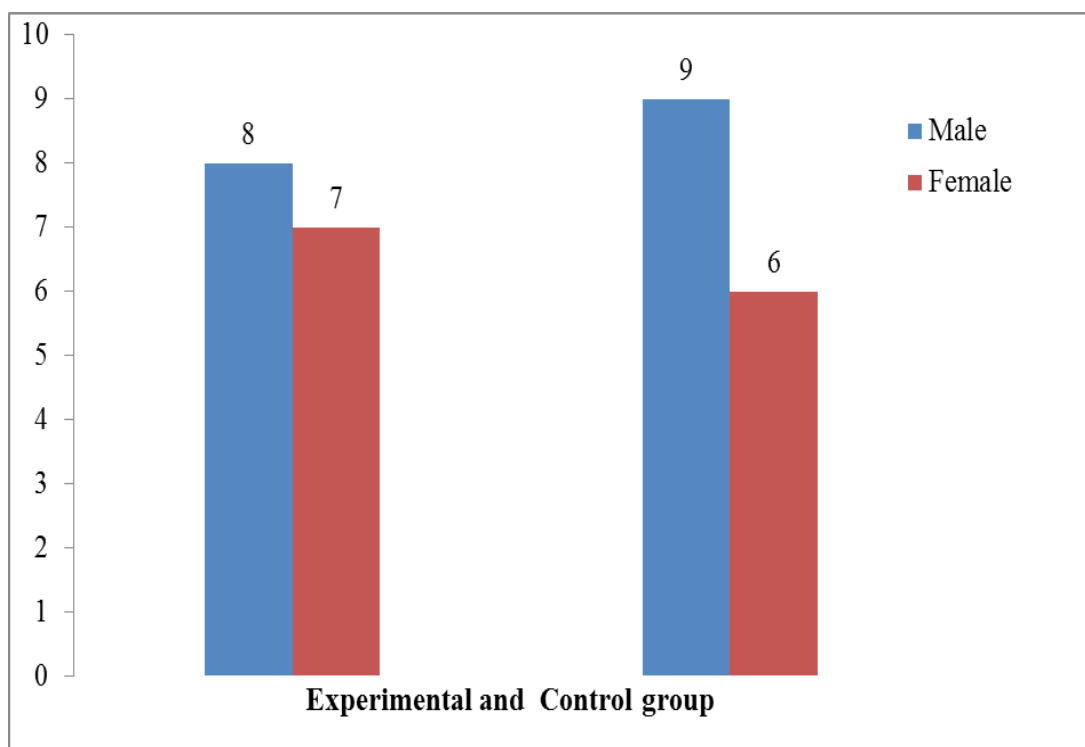
TABLE- 2**DESCRIPTIVE DATA OF CONTROL GROUP**

S.No	Age Year	Sex	Berg Balance Scale	
			Pre-test	Post test
1	48	M	37	41
2	47	M	36	39
3	48	F	37	41
4	53	M	38	43
5	54	M	38	42
6	46	F	35	37
7	49	M	36	39
8	50	F	35	38
9	53	M	37	39
10	52	M	38	40
11	47	F	39	41
12	48	M	37	40
13	54	M	35	38
14	53	F	36	39
15	52	F	38	41

TABLE – 3
DEMOGRAPHIC PRESENTATION OF SEX

CONTENT	CONTROL	EXPERIMENTAL
Male	8	9
Female	7	6
Total	15	15

GRAPH- I
SEX WISE DISTRIBUTION IN CONTROL GROUP AND
EXPERIMENTAL GROUP



The above bar graph shows, in control group 9 males and 6 females were selected; and in experimental group 8 males and 7 females were selected.

TABLE 4

**PRE TEST MEAN AND STANDARD DEVIATION OF BERG BALANCE
SCALE CONTROL AND EXPERIMENTAL GROUP**

GROUP	N (No. of Subjects)	MEAN	STD. DEVIATION
CONTROL	15	36.80	1.26
EXPERIMENTAL	15	37.00	1.73

TABLE 5

**POST TEST MEAN AND STANDARD DEVIATION OF BERG BALANCE
SCALE**

GROUP	N (No. of Subjects)	MEAN	STD. DEVIATION
CONTROL	15	39.87	1.67
EXPERIMENTAL	15	46.13	1.30

GRAPH-II
MEAN DIFFERENCE OF BERG BALANCE SCALE IN CONTROL AND
EXPERIMENTAL GROUP

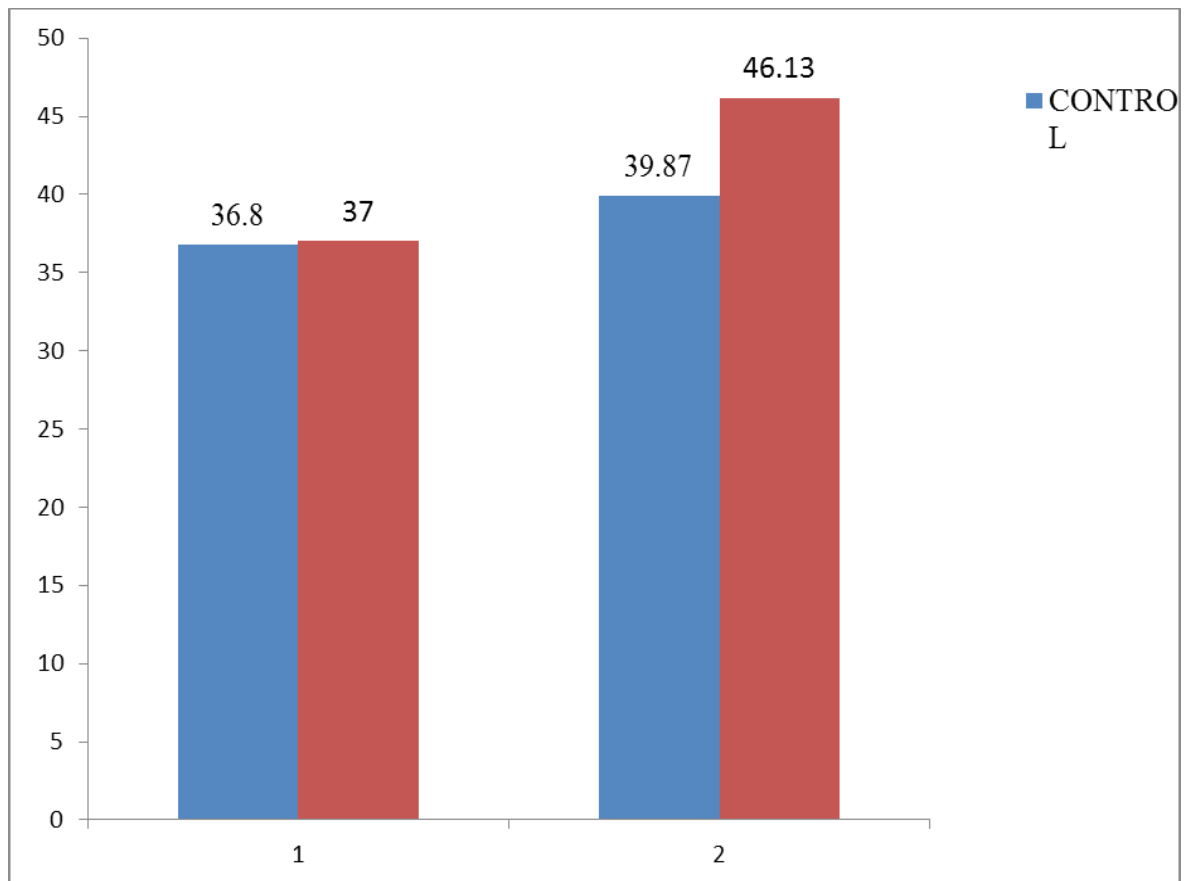


TABLE 6

INTERPRETATION OF DATA:

STATISTICAL ANALYSIS OF BERG BALANCE SCALE IN CONTROL

GROUP USING PAIRED 't' TEST

GROUP CONTROL	MEAN		SD	T	DF
BBS	PRE	36.80	1.26	13.44	14
	POST	39.87	1.64		

Interpretation-Berg Balance Scale in control group-

Above table shows the mean of the pre test data for the control group as 36.80 ± 1.26 (SD) and post test value as 39.87 ± 1.64 (SD). The calculated t value is 13.44, which are greater than that of table value (2.145). It indicates that there is significant difference between pretest and post test values of Berg Balance scale in control group.

GRAPH-III

MEAN DIFFERENCE AND STANDARD DEVIATION OF BERG BALANCE SCALE IN CONTROL GROUP

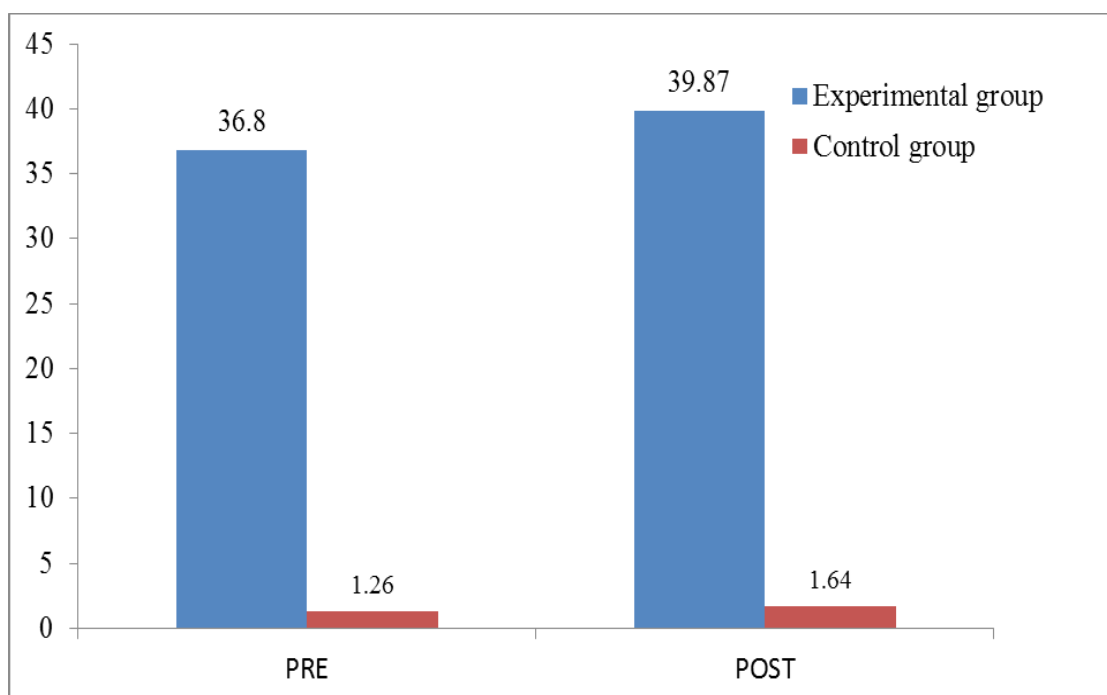


TABLE 7
STATISTICAL ANALYSIS OF BERG BALANCE SCALE IN
EXPERIMENTAL GROUP USING PAIRED t TEST

GROUP EXP	MEAN		SD	T	DF
BBS	PRE	37.00	1.73	17.73	14
	POST	46.13	1.30		

Interpretation-Berg Balance Scale in experimental group

Above table shows the mean of the pre test data for the experimental group as 37.00 ± 1.73 (SD) and post test value as 46.13 ± 1.30 (SD). The calculated t value is 17.73 which is greater than that of table value (2.145). It indicates that there is significant difference between pretest and post values of Berg Balance Scale in experimental group.

GRAPH-IV

**MEAN DIFFERENCE AND STANDARD DEVIATION OF BERG
BALANCE SCALE IN EXPERIMENTAL GROUP**

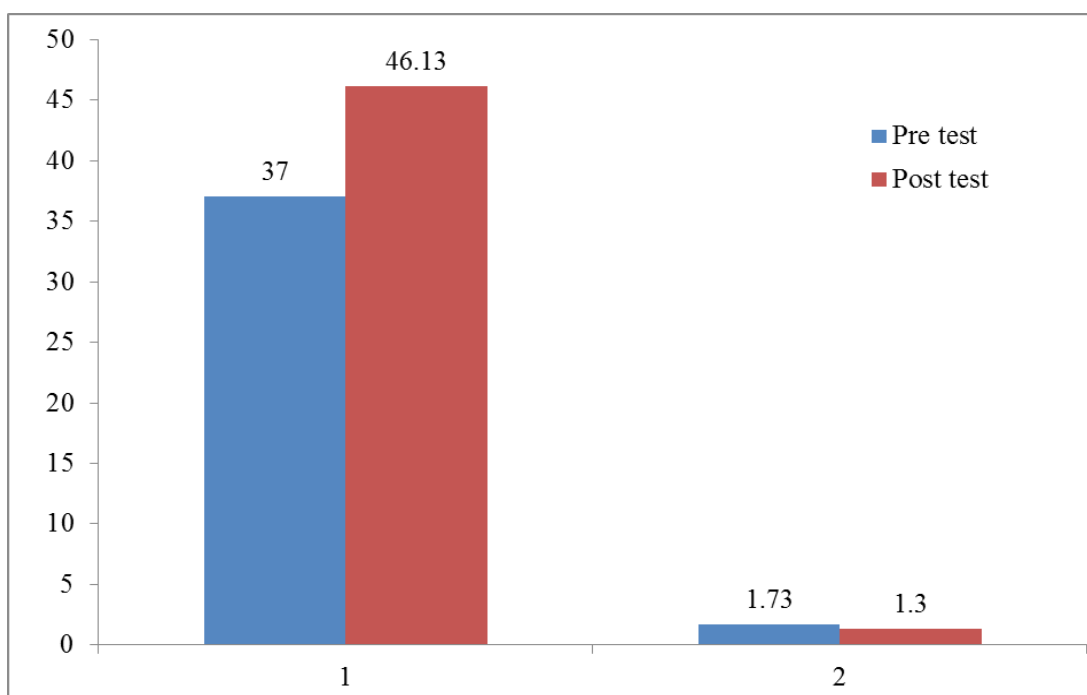


TABLE 8
STASTICAL ANALYSIS OF BERG BALANCE SCALE OF PRE TEST
VALUE USING INDEPENDENT T TEST

Experimental and control group pre test value	MEAN		SD	t	DF
BBS	EXP	37.00	1.73	0.361	28
	CTRL	36.80	1.26		

INTERPRETATION-BERG BALANCE SCALE CONTROL AND EXPERIMENTAL GROUP PRETEST VALUE

Above table shows the mean of pre test data for experimental group as $37.00 \pm 1.73(\text{SD})$ the calculated t value is 0.361 and control group mean 36.80 ± 1.26 and calculated t value is 0.361 for both experimental and control group. It indicates that there is no significant difference between experimental and control group.

GRAPH-V
MEAN DIFFERENCE AND STANDARD DEVIATION OF BERG
BALANCE SCALE IN EXPERIMENTAL AND CONTROL GROUP
USING INDEPENDENT t TEST

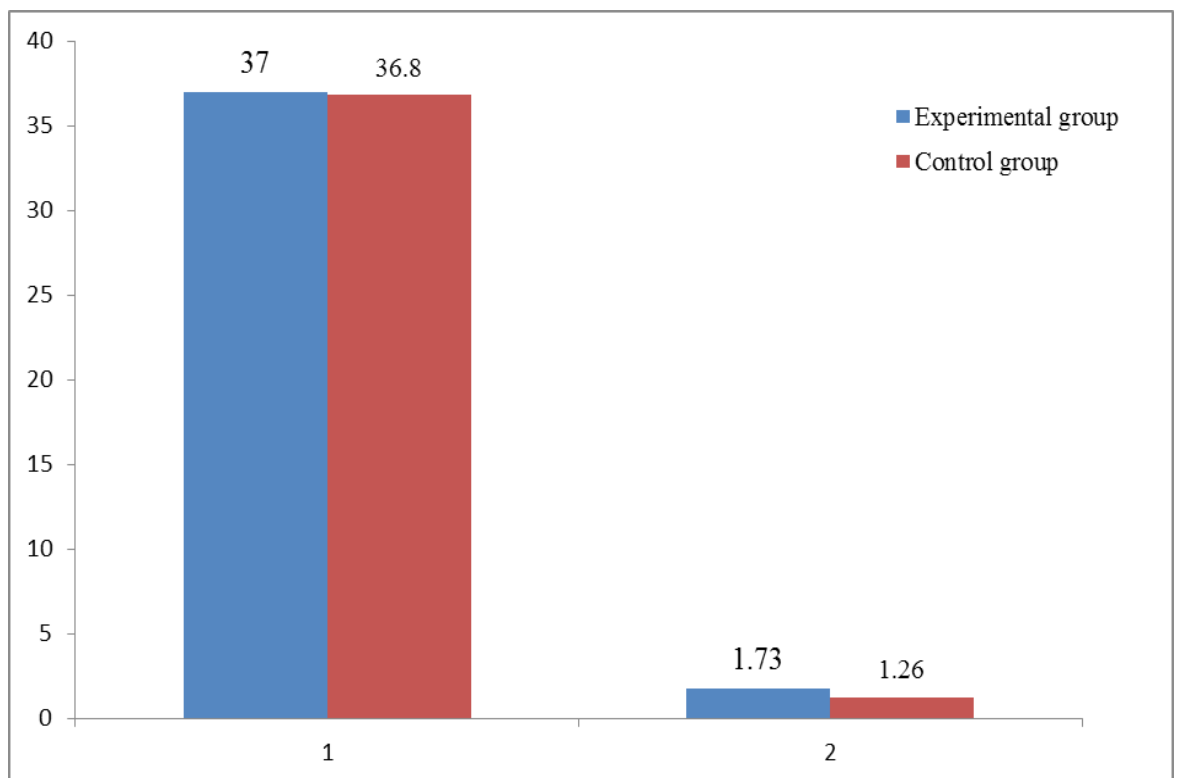


TABLE 9
STASTICAL ANALYSIS OF BERG BALANCE SCALE
POST TEST VALUE USING INDEPENDENT t TEST

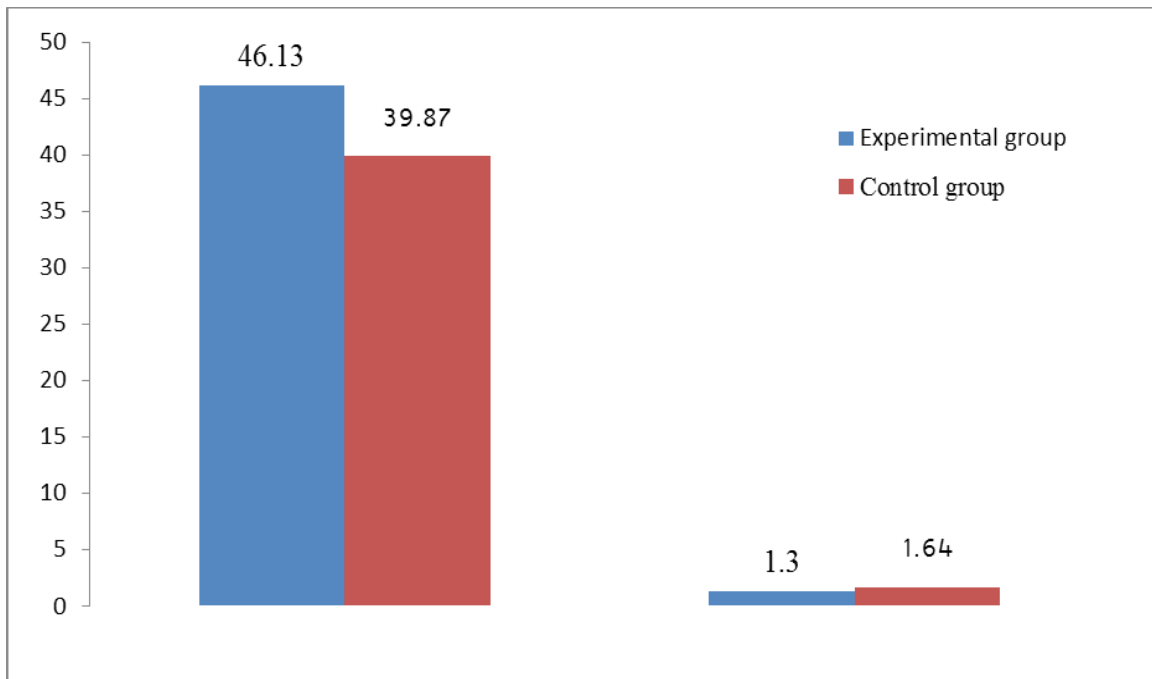
Experimental and control group post test value	MEAN		SD	T	DF
BBS	EXP	46.13	1.30	11.58	28
	CTRL	39.87	1.64		

INTERPRETATION- BERG BALANCE SCALE CONTROL AND EXPERIMENTAL GROUP POST TEST VALUE

Above TABLE shows the mean of post test data for experimental group as 46.13 ± 1.30 (SD) the calculated t value is 11.58 and control group mean 39.87 ± 1.64 and calculated t value is 11.58 for both experimental and control group. It indicates that there is a significant difference experimental group value than control group

GRAPH - VI

**MEAN DIFFERENCE AND STANDARD DEVIATION OF BERG
BALANCE SCALE IN POST TEST VALUES OF EXPERIMENTAL AND
CONTROL GROUP USING INDEPENDENT t TEST**



5. RESULTS AND DISCUSSION

Results

A total of 30 patients participated in the study. The data analysis was done using paired t-test and analysis of covariance.

Mean values of pre test and post test

The mean values of berg balance scale, pre test scores of group A [conventional therapy] and group B [motor relearning programme] were 36.80 and 37.00 respectively. The mean values of berg balance scale, post test scores of group A and group B were 39.87 and 46.07 respectively.

Mean values of group A and group B

The mean values of control group and experimental group results shows significantly higher improvement in experimental group than control group [9.07 and 3.07]. Since the p value < 0.0001 , the difference in the mean values of pre test and post test are significantly different.

So we conclude that, there is significant improvement in balance in right side hemiparesis patients following motor relearning programme. Thus rejecting the null hypothesis i.e., there is no significance in the effectiveness of motor relearning programme in right side hemiparesis patients to improve balance.

Discussion

The study was an experimental study, conducted to assess the effectiveness of motor relearning programme for improving balance in right side hemiparesis patients. The ability to maintain balance is fundamental for daily activities and it

requires upright mobility such as transfer and walking. Total of thirty patients were participated in the clinical trial. Patient with right side hemiparesis of age group between 45 and 55 years were selected for the study. Age of subjects [mean age group = 50.27, 49.53].The present study demonstrate that there is significant difference in balance between group A and group B patients treated with conventional physiotherapy and Motor relearning programme respectively [$p < 0.0001$].

This was contradictory to other studies which indicate that there is no significant difference between Motor Relearning Programme and conventional therapy. Birgitta (2003) conducted a study on “Bobath or motor relearning programme- A follows up one and four years post stroke”. The study found no significant difference in the measured variables treated with motor relearning programme versus the group treated with Bobath. But the study conducted by Dora(2006)strongly supports my study which found that Motor Relearning Programme was found to be effective for improving balance in stroke patients.

The control group were given conventional therapy and experimental group were given motor relearning programme. Both groups were selected in this study were assessed on the first day prior to the treatment and the last of sixth week. Tools were taken for measuring the outcome of balance was Berg balance scale.

Statistical analysis was done using paired t- test and unpaired t-test. In order to compare effect of treatment pre test post test scores were analyzed using paired sample test is the test for significant difference .In order to test whether there is significant difference between control and experimental group, unpaired t-test was performed by taking Pre test scores of control and experimental group and post test scores of control and experimental group.

On statistical analysis, the mean difference of post test of group A, Berg balance scale is 39.87 and group B, berg balance scale is 46.07. Since the p value is <0.0001 , the difference in the mean values of Pre and post test are significantly different. The post test values of Berg balance scale in Conventional therapy alone shows a slight increase in balance [mean value 3.07]. So there is mild improvement in balance in right side hemiparesis patients treated with conventional therapy alone.

The post test values of Berg balance scale in Motor relearning programme, group B shows a significant increase in balance [mean value 9.07], so there is significant improvement in balance in right side hemiparesis patients treated with Motor Relearning Programme.

So it is clearly evident that there is significant difference in experimental group over control group after evaluation of post test berg balance scale scores.

Since the advances of the sciences in the recent decades and the gradual understanding of neurophysiologic principles in movement control, new concept about the optimal physical treatment strategy for movement disorders in patients with brain damage have been developed resulting in new approaches . One of these approaches was the Bobath concept later known as Neurodevelopment therapy. Since the introduction of the Bobath approach there has been much criticism on the effectiveness of concept.

A recent Cochrane systematic review [14 trials, n=886 pts] critically appraised and reviewed the literature about the effects of treatment approached aimed at promoting postural control and lower limb function such as Bobath/NDT, Brunnstorm, Proprioceptive Neuromuscular Facilitation, and Motor relearning programme the explorer whether there was any difference in functional

independence depending on which physiotherapy the patients stroke received. Pollock and colleagues conducted that currently no evidence exist that one physiotherapy is superior in promoting recovery of disability after stroke .A mix of components from different approaches, an eclectic approach, seems to be more effective than number of treatment or placebo control in attaining functional independence following stroke.

Although physiotherapists use different approaches in stroke till 2005, no specific values for physiotherapy in management of patients with stroke were published, even though physiotherapy account for a substantial proportion of the total therapy time provided for stroke rehabilitation services ranging from 44% to 90%. In other words detailed, evidence based clinical practice guidelines for physiotherapy management for patients with stroke is needed. The result of the study reveal that, patients who were trained under motor relearning programme appeared to a higher level of performance under control group .There is statically significant improvement was seen in the experimental group than in control group, even though improvement seen in both group. The result also provides usefulness of motor relearning programme in improving balance activities in right side hemiparesis patients.

In this study patient is given with goal oriented training for 30 minutes in there experimental group which requires active participation of the patients which result in motor control rather than improving muscle strength. Avoiding unwanted muscle activity also leads to co-ordinate movement.

Motor and functional recovery after stroke varies to a greater extends between individual and has been repeatedly demonstrated that following stroke, patient often suffers from impaired balance control. Postural asymmetry and recovery of standing balance varies depending on the stage of recovery following stroke .The difference in

balance existing in stroke patients based on location of lesion and difference in balance persisting during late recovery from stroke are the important questions to be answered. But not have been studied extensively.

The restoration of balance is an important part of stroke rehabilitation, knowing the difference in balance between right and left stroke patients can help the therapist to plan an effective strategy for the purpose of comprehensive rehabilitation based upon the location of lesion.

In conclusion, this study investigated the efficacy of the motor training programme designed to improved balance control in right side hemiparesis patients. The result demonstrate that the training program which was designed from existing scientific knowledge about human movement and how persons acquire skill in movement was effective .Training involved sitting up over the side of the bed, balanced sitting by reaching forward and sideways to touch an object, standing balance with systematic variation of speed, type of task, seat height, extend of high support and distance and duration reached. Subjects significantly increased from the affected lower limb to support balance and were able to reach faster and further. Furthermore, they also significantly increased the load taken though the affected foot when standing up from sitting. The study highlights the value of designing scientifically based rehabilitation programme

6. SUMMARY AND CONCLUSION

Summary

The study was aimed to evaluate the ‘Effectiveness of Motor relearning programme in balance in right side hemiparesis patients’. After taking 30 patients, randomly divided into a Control Group and Experimental Group of 15 patients each. Control Group received Conventional Therapy and Experimental Group received Motor relearning programme. Both Control Group and Experimental Group were given training for a period of 30 minutes for 4 days per week for 6 weeks. The outcome measures used for the study were Berg balance scale. The measurements were taken prior to the commencement of treatment (pre-test) and after 6 weeks (post-test). Statistical analysis was done using paired t test. Paired t test is used to find the significant differences in the growth between pre test and post test. Unpaired t- test is used to find the significant difference between Group A and Group B. Results obtained can be summarized that the Motor relearning programme shows significant improvement in balance of patients with right side hemiparesis.

Conclusion

Motor relearning programme caused in improvement in balance in right side hemiparesis patients. It was shown that both MRP and Conventional physiotherapy have effect on balance in stroke patients though MRP shown better improvement in balance in right side hemiparesis patients. Thus MRP treatment protocol can act as valuable, alternative in the rehabilitation of the stroke patients with right side hemiparesis stroke.

7. LIMITATIONS AND RECOMMENDATIONS

Limitations

1. The study was done on a small sample size.
2. This study assessed only short term progress of the patient.
3. All measurements were taken manually and this may introduce human error, which could threat the studies reliability.
4. The study was limited to balance improvement only i.e., only sitting balance and standing balance i.e. mainly emphasis on trunk and lower limbs.
5. Lack of control or lack of patient's brain lesion site.
6. The follow up period was short
7. Sensory recovery is not taken into consideration.
8. The researcher does not have control over the patient during his activities at hospital, other than what is prescribed to be.

Recommendations

1. Long duration study can be done to find the persistence of changes produced due to Motor relearning programme.
2. To establish the efficacy of the treatment, sample study can be made bigger than this study.

3. Further investigations are needed to concerning the most appropriate use of motor relearning programme.
4. Future studies can be conducted on other areas affected by stroke for eg. Gait
5. Further studies can be conducted on Motor relearning programme by using various outcome measures.

8. BIBLIOGRAPHY

SL NO	AUTHOR	BOOK NAME	PUBLICATION
1	Susan B'O Sullivan	Physical rehabilitation	Jaypee Brothers
2	Darcy. A.Umpherd	Neurological rehabilitation	Mosby Elsevier Publications
3	Guyton and Hall	Medical physiology	W.B Saunders Company
4	Carr GH, Shepherd RB	A Motor Relearning Programme for stroke	William Heinemant medical books
5	Randall. L.Braddom	Physical medicine and rehabilitation	Saunders publications
6	B D Chaurasia	Human Anatomy volume	CBS Publishers
7	Mitchell.H.Cameron	Physical Rehabilitation	Saunders Elsevier publications
8	Randall.L.Braddom	Physical medicine and rehabilitation	Saunders publications
9	Lalit Kalra	Facilitating Recovery: evidence for organized stroke	J Rehabil Med
10	Maurice Victor	Adams and Victor Principles of Neurology	Mc Graw-Hill Publications
11	R.S. Stevens	A randomized controlled trial of a stroke rehabilitation ward	Oxford Journals

9. ANNEXURE

ANNEXURE - 1 BERG BALANCE SCALE

SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

() 4 able to stand without using hands and stabilize independently

- () 3 able to stand independently using hands
- () 2 able to stand using hands after several tries
- () 1 needs minimal aid to stand or stabilize
- () 0 needs moderate or maximal assist to stand

STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding on.

- () 4 able to stand safely for 2 minutes
- () 3 able to stand 2 minutes with supervision
- () 2 able to stand 30 seconds unsupported
- () 1 needs several tries to stand 30 seconds unsupported
- () 0 unable to stand 30 seconds unsupported

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

- () 4 able to sit safely and securely for 2 minutes
- () 3 able to sit 2 minutes under supervision
- () 2 able to sit 30 seconds
- () 1 able to sit 10 seconds
- () 0 unable to sit without support 10 seconds

STANDING TO SITTING

INSTRUCTIONS: Please sit down.

- () 4 sits safely with minimal use of hands
- () 3 controls descent by using hands
- () 2 uses back of legs against chair to control descent
- () 1 sits independently but has uncontrolled descent
- () 0 needs assist to sit

TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

- () 4 able to transfer safely with minor use of hands
- () 3 able to transfer safely definite need of hands

() 2 able to transfer with verbal cuing and/or supervision

() 1 needs one person to assist

() 0 needs two people to assist or supervise to be safe

STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

() 4 able to stand 10 seconds safely

() 3 able to stand 10 seconds with supervision

() 2 able to stand 3 seconds

() 1 unable to keep eyes closed 3 seconds but stays safely

() 0 needs help to keep from falling

STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding on.

() 4 able to place feet together independently and stand 1 minute safely

() 3 able to place feet together independently and stand 1 minute with supervision

() 2 able to place feet together independently but unable to hold for 30 seconds

() 1 needs help to attain position but able to stand 15 seconds feet together

() 0 needs help to attain position and unable to hold for 15 seconds

REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at

the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is

the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use

both arms when reaching to avoid rotation of the trunk.)

() 4 can reach forward confidently 25 cm (10 inches)

() 3 can reach forward 12 cm (5 inches)

() 2 can reach forward 5 cm (2 inches)

() 1 reaches forward but needs supervision

() 0 loses balance while trying/requires external support

PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper, which is in front of your feet.

() 4 able to pick up slipper safely and easily

() 3 able to pick up slipper but needs supervision

() 2 unable to pick up but reaches 2-5 cm(1-2 inches) from slipper and keeps balance independently

() 1 unable to pick up and needs supervision while trying

() 0 unable to try/needs assist to keep from losing balance or falling

TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. (Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.)

- () 4 looks behind from both sides and weight shifts well
- () 3 looks behind one side only other side shows less weight shift
- () 2 turns sideways only but maintains balance
- () 1 needs supervision when turning
- () 0 needs assist to keep from losing balance or falling

TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

- () 4 able to turn 360 degrees safely in 4 seconds or less
- () 3 able to turn 360 degrees safely one side only 4 seconds or less
- () 2 able to turn 360 degrees safely but slowly
- () 1 needs close supervision or verbal cuing
- () 0 needs assistance while turning

TOTAL (0–56):

ANNEXURE – 2 ASSESSMENT FORM

A. DEMOGRAPHIC DATA

Name:

Age:

Date of admission:

Sex:

Date of assessment:

Occupation:

Marital status:

Chief complaints:

B. HISTORY

Present medical history

a) Onset: Sudden/Acute/Gradual

b) Duration:

c) Symptoms:

- Headache
- Vomiting
- Convulsions
- Unconsciousness
- Paralysis Partial/Total/Face-UL/LL
- Sensory Disturbances: Yes/No
- Language Dysfunctions: Yes/No

Past medical history

a) CVA

TIA

RIND

Complete stroke

b) Hypertension: Yes/No

Duration: Detected now/.....years

Medication: yes/no, regular/irregular

Present status: controlled/uncontrolled

c) Cardiac disease

Congenital

Valvular

Congestive cardiac disease

Ischemic heart disease

Duration

d) Peripheral vascular disease: Yes/No

Duration

Site

Treatment

e) Diabetes mellitus: Yes/No

Duration

Treatment: Regular/Irregular

Present status: controlled or uncontrolled

f) Any other relevant illness: yes/no

Family history

History of ischemic heart disease/myocardial infraction

Hypertension/Cerebrovascular accidents

Personal history

a) Physical activities: Active/Inactive

b) Smoking and duration

c) Alcohol intake: Yes/No

d) Personality type: Calm/Anxious

Prior level function

Life style and home environment

Socioeconomic history

C. ON OBSERVATION

Physical built

Attitude of the limb

Tropical changes

External appliances

Others

D. ON PALPATION

Warmth

Tenderness

Swelling

Muscle firmness

Distal pulses

Others

E. ON EXAMINATION

1. Vital signs

Heart rate

Blood Pressure

Respiratory

Temperature

2. Neurological Examination

- Level of consciousness(GCS)
- Mini mental state test

Memory: Short/Intermediate/Long

Orientation

Intelligence

Attention

Speech

Cranial Nerve Examination

3. Motor Examination

a) Power

Upper limb	Right	Left
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Lower Limb	Right	Left
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b) Tone

Upper Limb

Lower Limb

c) Reflexes

Superficial reflex

Deep reflex

d) Voluntary control

e) Range of motion

Upper Limb	Right	Left
------------	-------	------

Lower Limb	Right	Left
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4. Sensory examination

a) Exteroception: normal/abnormal

Touch

Temperature

Pain

b) Proprioception: normal/abnormal

Joint position sense

Kinesthetic sense

Vibration

c) Combined and cortical sensation: normal/Abnormal

Steriognosis

Tactile localization

Two point discrimination

Barognosis

Graphaesthesia

5. Gait

Normal/Spastic/Ataxic/Hemiplegics

Cadence: Symmetrical/Asymmetrical

Arm swing

Base: Narrow/Broad

6. Co-ordination: Equilibrium/Non equilibrium

7. Balance

8. Posture

9. Deformity

10. Bladder and Bowel

11. Cranial Nerve Examination

12. Hand function:

Normal/Partially

Affected moderately

Affected fully

Affected

F. INVESTIGATION

C T Scan

MRI

Other investigations

Blood

EEG

ECG

G. PROBLEM LIST

Primary

Secondary

H. PROVISIONAL DIAGNOSIS

I. TREATMENT

Goals

Means

J. FOLLOW UP

ANNEXURE- 3 PATIENT CONSENT FORM

I _____ the research named
**“EFFECTIVENESS OF MOTOR RELEARNING PROGRAMME TO
IMPROVE BALANCE IN MILD TO MODERATE STROKE PATIENTS”**

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of Participant :

_____ voluntarily consent to participate in

Signature of the Witness :

Signature of Researcher :

Date :

Place :